OFFICIAL DEVELOPMENT ASSISTANCE EFFECT ON INFANT MORTALITY AND HUMAN DEVELOPMENT INDEX : ASIA EVIDENCE

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ABSTRACT

Official Development Assistance (ODA) is a program formed by the Development Assistance Committee (DAC) which aims to improve country development and eradicate poverty in developing countries. Many Asian countries are ODA recipients. The purpose of this study is to determine the effect of ODA on infant mortality and the Human Development Index. Panel data method is used to estimate the regression. Estimation results show that ODA has a significant effect on HDI, but not significantly on infant mortality. . In order to increase ODA impact on HDI, it is also expected to allocate ODA to the education sector and the like. The governments of Asian countries shall provide programs for newborn children, such as providing free immune and brain vitamins. The government is expected to eliminate various obstacles for forein investors so that incoming FDI can be used to improve HDI in the country

Keywords: ODA, Infant Mortality, HDI, Labor Force, Fertility Rate

JEL: F10; F35; I15

Introduction

Official Development Assistance (ODA) is a program created by Development Assistance Committee (DAC) which aims to improve country's development and reduce poverty in developing countries (DAC, 2008). DAC is a committee formed by 30 developed countries. Majority of fund contributor comes from member of DAC and European Union (EU), also from international organizations such as World Bank, International Monetary Fund (IMF), United Nations Children's Fund (UNICEF) and United Nations Development Programme (UNDP).

Asia is one of the regions where most of the countries are still developing countries. Countries in Asia still need assistance for official development, the main development comes from the DAC in the form of Official Development Assistance (ODA). ODA as a policy of assistance is an

example of how developed countries contribute to the prosperity of developing countries. Developing countries in Asia utilized ODA for economic development, but it also created dependency towards developed countries.
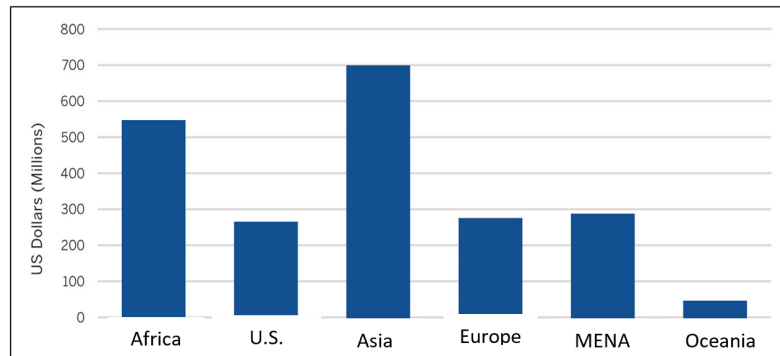
Figure 1: ODA Recipien Countries in the Asia Region that Received ODA in 2010-2017
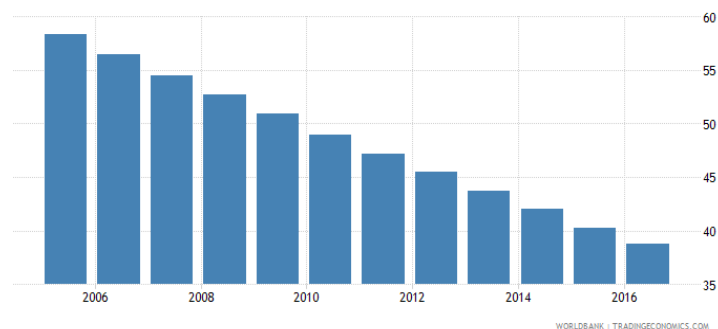Source: World Bank (2017)

Note :

1. MENA: Middle East and North Africa
2. Oceania : Polynesia, Melanesia and Micronesia

Figure 1 shows the Asian region is being the largest recipient of ODA. A value of 700 million USD means that many Asian countries still require ODA in order to mobilize development financing for sustainable growth in the Asian region. ODA is given by official institutions which are directed at economic development and community welfare.

Figure 1 also shows that the MENA region (Polynesia, Melanesia and Micronesia) and OCE-ANIA has received the lowest ODA. Many countries in those regions require ODA, but official institutions have not yet provided it. Official development assistance will increase public spending on the health sector, thereby reducing infant mortality in developing countries (Gomanee et al., 2005). Boone (1996) gives a different opinion, because official development assistance may not be for the benefit of the poor, so there was no improvement in health. This happened because the political elite would likely be benefited from the assistance, resulting in inefficiencies in aid.

Figure 2 shows that infant mortality rates in Asia continue to decline. This means that the health status of babies in Asia continues to improve. Decreasing infant mortality reflected an improve related to maternal knowledge about pregnancy, mothercare during pregnancy, nutrition, and the competent health services.

In the explanation of Sustainable Development Goals (SDGs), U. N. (2015) infant mortality rates are the subject of discussion in MGDs and SGDs. This is because the infant mortality rate is one of the goals that must be lowered by the country. The actual causes of infant death can be prevented. Because of the high number of cases and the extent of the impact of infant mortality, it has become fourth objective of the Millennium Development Goals (MDGs), while SDGs is a development of MGDs. The era of SDGs began with a meeting held on September 25-27, 2015 at the United Nations (United Nations) headquarters, New York, United States. The event was a ceremony for the ratification of the SDGs document which was attended by representatives from 193 countries. SDGs document was also triggered to continue and strengthen the achievements of the previous MDGs so that it could continues onward (SDGs, U. N, 2015).

Figure 2: Average infant mortality in Asian countries (per 1000 births)

Source: World Bank (2016)

There are 7 (seven) reasons why SDGs are better than MDGs, namely:

1. SDGs are more global in collaborating their programs. The MDGs were previously created by members of the Organization for Economic Cooperation and Development (OECD) countries and several international institutions. While SDGs are made in detail with international negotiations which consist of middle-income and low-income countries.

2. The private sector will also have the same, even greater role.

3. MDGs do not have basic human rights standards. The MDGs are seen as failed to give equal priority to justice in forms of discrimination and human rights violations, which ultimately results that many people trapped in poverty. While the SDGs are considered to have better human rights principles.

4. SDGs are inclusive programs. Seven SDGs targets are very explicitly aimed at people with disabilities, and in addition to six targets for emergency situations, there are also seven universal targets and two targets aimed at anti-discrimination.

5. The indicators used provide opportunities for civil society involvement.

6. The UN considered to be able to inspire countries in the world with SDGs.

7. Conference of the Parties 21 (COP21) in Paris formed a global agreement on climate change as a transitional framework towards a low carbon economy which resilience to climate change.

Official Development Assistance (ODA) can also affect human development. According to Niyonkuru (2016), ODA provides aid in the form of social, economic, and others. Social assistance includes education, water supply, and sanitation aimed at improving human development (Addison & Tarp, 2015).

According to Yiew (2018) ODA in the form of economic assistance such as energy, transportation, and communication systems has an important role in economic development in the recipient country. On the other hand, production sector assistance is aimed at agriculture, forestry, fisheries, the mining industry, construction, trade, tourism, and will encourage income and improve the welfare of the recipient country.

Figure 3 shows different index of human development in the Asian region in 2017. This means that the performance of each country to improve the quality of human development is also different. The different components forming the Human Development Index such as life

expectancy, differences in average length of schooling, and decent standard of living in each country also differ the quality of human development.

Asiama & Quatery (2009) conducted research between ODA and human development. The aim of Asiama & Quatery (2009) research is to analyze the effect of ODA on human development. The method used is panel. The results showed that ODA had a significant effect on the quality of human development.
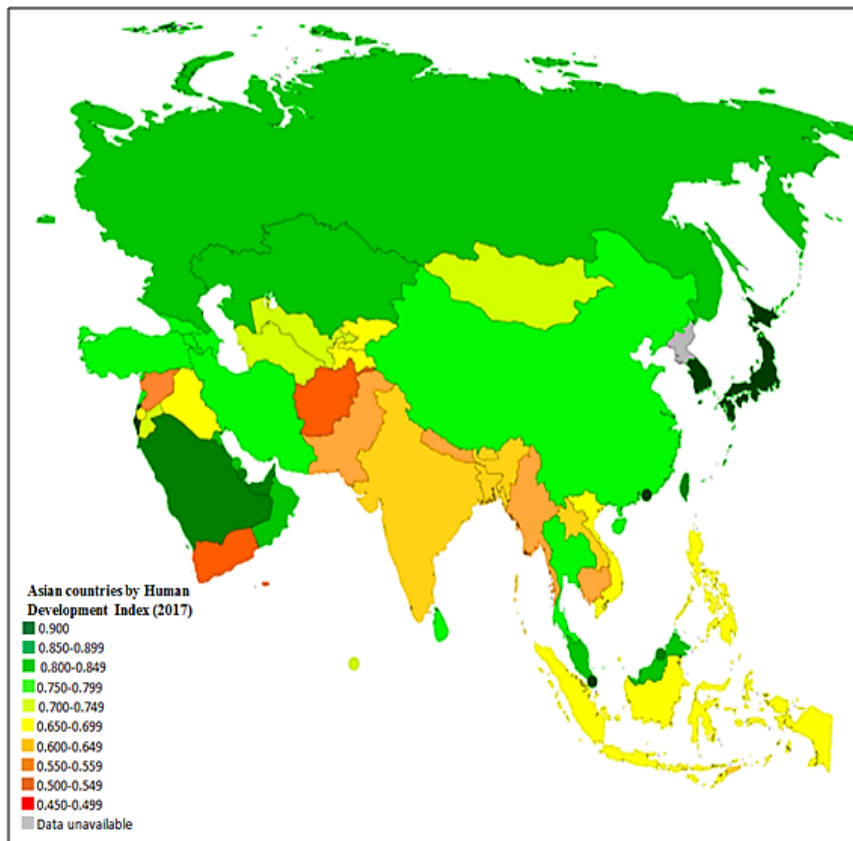
Figure 3: Average Human Development Index in Asian Countries

Source: World Bank (2017)

GDP can be used as indicator that influence infant mortality. Bellante & Jackson (2007) state that there is an increase in GDP, cateris paribus on increasing family income, but does not change the time value of a wife. The effect of an increase in family income will cause an increase in demand for goods to be consumed by households. An increase in family income causes a wife to prefer to stay home and take care of the baby rather than enter the labor force thereby reducing infant mortality.

Various studies have attempted to provide an analysis of why aid is effective and ineffective in receiving countries. Some authors argue that ODA which has an effective impact means that the allocation of aid funds is appropriate and properly utilized, so that human development in the recipient country would increased, but ODA is less effective because of the lack of recipient country's capacity to utilize foreign aid appropriately, so that human development did not change (Collier & Dollar 2002; Collier & Hoeffler 2002; Collier 2006).

ODA with the right allocation would improve the quality of education through improving school infrastructure so that ultimately it will improve literacy rates, skills, and basic

vocational skills including aspects of compliance, principle, accuracy, and timely which lead to productive behavior (Vocational Skill) graduates school. It is hoped that by increasing the quality of Human Resources (HR), it will improve the competitiveness of the workforce and will improve the welfare of HR.

Birth rates and the labor force are also used to influence infant mortality. Manning (1998) in Ogawa & Akter (2007) states that the higher level of education of women and followed by declining fertility, delay in marriage time, and easy access to child care facilities, and the more flexible regulation at work are factors that increased women's participation in the labor market. Conversely, the lower survival rate for children, the higher the level of fertility. This hypothesis based on the assumption that, in situations where the incidence of infant mortality is high, parents will tend to produce the more children needed to ensure survival into adulthood. Schultz (1993) found that there is a possibility of bidirectional causality between fertility and infant mortality.

Infant mortality and birth rates are based on the demographic transition theory. Demographic transition is a term that refers to the transition from high to low birth and death rates because a country's economy or region develops from a pre-industrial economy to an industrialized economy. Most developed countries have gone through a demographic transition process and have low birth rates, while most developing countries are still experiencing this transition process, namely the higher the birth rate the higher the infant mortality rate.

Investment can affect infant mortality. Investment helps improve health conditions in the host country if it provides employees with better social services and safer workplaces. This will have an impact on health, especially women. These conditions will cause a decrease in infant mortality. Investment in infant mortality can affect indirectly. Pickbourn (2016) argues in his research that investment influences infant mortality through economic growth. An increase in economic growth will push the average income level higher so that the infant mortality rate decreases.

Based on the background above, this study aims to analyze the influence of the role of official development assistance (ODA), population, GDP, investment and birth rates in influencing infant mortality in the Asia region, and human development in the Asian region. The topic was raised because Asian region still cannot be separated from financial assistance, so this study will see its influence on infant mortality and human development. To best our knowledge, research that has analyzed the effect of these variables on infant mortality and human development has never been done before in Asia.

Literature Review

ODA analysis is a topic that continues to be developed. Literature about ODA is found in many different research locations. ODA data were taken from the OECD (DCD-DAC). The OECD (DCD-DAC) establishes Official Development Assistance (ODA) as grants and loans to countries and regions in the list of ODA DAC recipients and to multilateral institutions which: (a) is carried out by the official sector; (b) with the promotion of economic development and welfare as the main objectives; and (c) with soft financial requirements (Daïa et al, 2014).

ODA utilization is occasionaly limited because ODA tends to be prioritized for education and civil society. Most are allocated to non-government institutions. Program assistance, which is expected to help the budget deficit tend has declined. Opportunities to use ODA funds for economic infrastructure and production are also limited. The implication of this situ-

ation is that non-ODA foreign funds should be directed to non-social sectors. On the contrary, the social sectors will be funded by ODA funds as far as possible. ODA is believed to reduce infant mortality. ODA is a factor that may be a determinant of infant mortality in developing countries. This may have benefits in considering the impact of providing aid more broadly than focusing narrowly on assistance in the health sector.

White (2007) investigated specific health interventions in Bangladesh, concluding that health outcomes were not related to ODA. The effect of ODA on health outcomes may be sooner or later. This depends on are ODA funds allocated to the targeted health sector or not. ODA that is appropriately allocated will improve the health status, in this case the infant mortality rate will decrease, but if ODA allocation is less precise, it will slow down the improvement of health status, or the infant mortality rate.
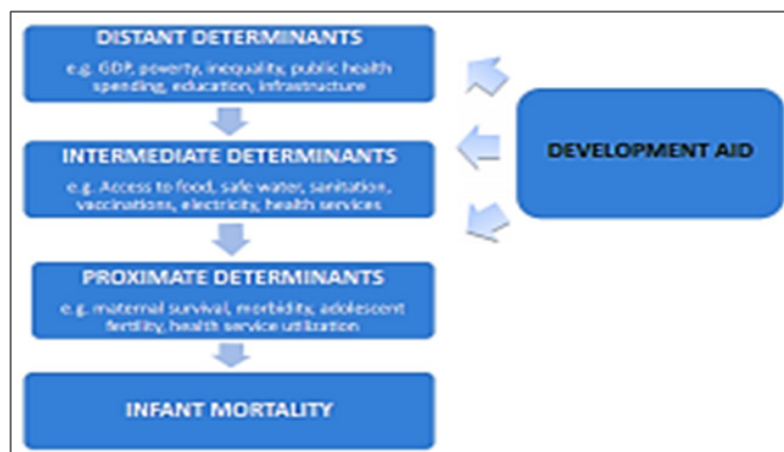
Figure 4: Transmission of the Effects of ODA on Infant Mortality in Asian Countries

Source: Schell et al. (2007: 290) and Sartorius and Sartorius (2014: 2)

Figure 4 shows the relationship between ODA and infant mortality. An increase in ODA will cause an increase in health spending, so that health services in Government Hospitals are getting better and more modern. An increasingly sophisticated medical device will cause the delivery process to run well, so the infant mortality rate decreases.

Labor force and birth rates are also used to influence infant mortality. Manning (1998) in (Ogawa & Akter, 2007) states that the higher level of education of women and is followed by decreased fertility, delay in marriage time, easy access to child care facilities, and increasingly flexible regulations at work are factors that make participation women in the labor market are increasing. Conversely, the lower the chances of survival for children, the higher the level of fertility. This hypothesis based on the assumption that in situations where the incidence of infant mortality is high, parents will tend to produce the more children needed to ensure survival into adulthood. Rosenzweig and Schultz (1985) and Schultz (1993) found that there is a possibility of bidirectional causality between fertility and infant mortality. On the other hand, Ghatak (1995) notes that developing countries do not have social security programs that serve parents. Therefore, having more children can be treated as an investment and considered a form of insurance in terms of social support for parents.

The total fertility rate is a synthetic measurement at the end of the reproductive period (completed fertility) from a female hypothesis (Adioetomo and Samosir, 2010). According to Samuelson and Nordhaus (2004: 278), when the country is prosperous enough and the infant mortality rate is low, then the community will automatically reduce its birth rate. If women

have a higher education, they will decide not to spend their lives just to take care of children. Some implications that can result in decreased fertility rates (Todaro and Smith, 2006: 318), include: 1) The higher level of education of women so that the role of women becomes better, 2) Job opportunities for women in non-agricultural sectors increase , 3) Expansion of employment opportunities in education so that parents can substitute the desire to have many children with the quality of these children.

Understanding the relationship between fertility rate and infant mortality has become a demographic topic that has been widely analyzed. Based on research by Jacob (1995) birth is one of the most important variables in infant mortality. The infant mortality rate increases with birth, if the birth process were not supported by a complete medical device. The results of the study by Bhargava et al (2005) show that infant mortality is exacerbated by the birth of infants that are not handled by medical personnel and lack health care.

Economic theory defines investment as "expenditures to buy capital goods and production equipment with the aim of replacing or adding capital goods in the economy that will be used to produce goods and services in the future". Dornbusch and Fischer (2008: 35) argue that investment is the demand for goods and services to increase production capacity or future income.

Investment can affect infant mortality and can help improve health conditions in the host country if it provides employees with better social services and a safer workplace. This will have an impact on health, especially women. These conditions will cause a decrease in infant mortality. Investment influences infant mortality through economic growth. An increase in economic growth will push the average income level higher so that the infant mortality rate decreases.

According to Arsyad (2010: 120) GDP is interpreted as an important indicator for analyzing economic development that occurs in a country. GDP is one of important ingridients in development process. The higher the value of GDP, the higher the economic growth. GDP is now seen as a variable that has the role of driving and encouraging human development. GDP and human development are interrelated and contribute to one another (Anggraini, 2012). UNDP (2011) revealed that the quality of human development can increase if supported by high GDP and balanced with income distribution so that economic growth will be very effective in improving human development. The contribution of GDP to human development by increasing government revenue which can then be invested in human development (Anggraini, 2012).

Official Development Assistance (ODA) is financial assistance provided by the government and other institutions to help the economic, environmental, social and political development of developing countries. ODA has contributed to the development in recipient countries. This is because recipient countries experience a lack of capital to carry out development.

Official development assistance can also affect human development. According to Niyonkuru (2016) ODA provided aid to the development of a country. This assistance can be formed in social, economic, or other things. Social assistance includes education, water supply, and sanitation aimed at improving human development (Addison & Tarp, 2015). According to Yiew (2018) ODA in the form of economic assistance such as energy, transportation, and communication systems has an important role in economic development in the recipient country. On the other hand, production sector assistance is aimed at agriculture, forestry, fisheries, the mining industry, construction, trade, tourism, and will encourage income and

improve the welfare of the recipient country.

Smith and Tickamyer (1978) uncover the reasons for the increased level of female labor participation in the United States using time series data evidence starting in 1900. They explain that there is a strong positive relationship between the number of uneducated women and female labor force participation in in 1900. This case was in contradiction between 1900 and 1940, because of the acceleration of economic development which increased, the demand for educated women workers has also increased. This is basically the characteristic of countries with advanced economies, that there is a positive relationship between women's labor force participation and women's education. According to their calculations, female labor participation rates were 21 percent in 1900, 29 percent in 1950 and 52.1 percent in 1981. They also stressed the importance of real wages on female labor force participation. They claim that increases in real wages account for 60 percent of the total growth of the female workforce. (Smith and Tickamyer, 1978)

One of the factors affecting population and the large population growth rate is fertility. Fertility is the real reproductive result of a woman or a group of women, while in the demographic sense it states the number of babies born alive. The size of the number of births in a population, depends on several factors, such as age structure, education level, age at the time of first marriage, number of marriages, employment status of women, use of contraception and income/wealth (Adioetomo and Samosir, 2011). Fertility can affect human development. Fertility will increase human development if the baby has a good and adequate nutrition. This is because it has an impact on the development of infant growth until adulthood. Babies are born with a healthy condition and parents provide them good nutritions, it will improve the quality of human development.

Investment is one of the important indicators in relation to a country's economy. The conventional (classical) theory of investment is based on the marginal productive theory of capital production. Based on this theory, the amount of capital to be invested in the production process is determined by its marginal productivity compared to the interest rate, so that investment will continue to be made if the productivity limit of the investment is still higher than the interest rate to be received. Investment will be carried out if the income from the investment (prospected yield) is greater than the interest rate. Investment also plays an important role in influencing human development. As one of the sources of GDP income, inward investment contributes more on increasing income directly to the community through Transnational Corporation in the recipient country, as well as technology transfer which helps the acceleration of human development. The main objective of the investment is expected to be able to create employment that can improve the welfare of a country, so that the increase in welfare in various dimensions can be represented through the Human Development Index (HDI).

Asiama & Quatery (2009) conducted research on ODA and human development. The purpose of Asiama & Quatery (2009) research is to test and analyze the effect of ODA on human development. The method they used is dynamic panel. The results showed that ODA had a significant effect on human development. Shirazi et al. (2009) also conducted research on ODA and human development. Shirazi's research objective is to test and analyze the impact of ODA on human development in Pakistan. The method used is VECM. The research results of Shirazi et al. (2009) is ODA significantly influence human development.

Kotsadam et al (2018) conducted research on ODA for infant mortality. The method used is panel data regression with micro or survey data. The results of the study by Kotsadam

et al (2018) shows that ODA has a significant effect in reducing infant mortality in Nigeria. Another researcher, Ullah et al (2011) also conducted research with the aim of finding out the main factors that influence infant mortality in Pakistan. Ullah et al (2011) examines the relationship of infant mortality with economic factors consisting of: GDP and social factors such as; population. The method used is VECM. The conclusion is that GDP is negatively related to infant mortality, but the population is positively related to infant mortality.

Arik and Arik (2009) conducted research on infant mortality in the provinces of Turkey. The research objective was to analyze infant mortality rates that are influenced by socio-economic variables. Samples were taken in 81 provinces from Turkey. The dependent variable used in Arik and Arik (2009) is infant mortality rate while the independent variable is population. The analytical tool used is VECM. The period taken for research is 1970-2008. The conclusion obtained from Arik and Arik (2009) is that the population is negatively related to infant mortality.

Hukom (2015) conducted research on the human development index for the period 2006-2013 in the province of Central Kalimantan (Indonesia). The purpose of the research conducted by Hukom (2015) is to describe the development of the Human Development Index (HDI) in Central Kalimantan Province in 2006-2013 and analyze the effect of GDP on the Human Development Index (HDI) in Central Kalimantan. The research method used is panel data regression. The results obtained are GDP has a positive and significant effect on the Human Development Index (HDI) in Central Kalimantan.

Research Methodology

Model Analysis

This study uses the econometric method of panel data regression. The model used in this study was adopted from various journals. The following models of this study are:

$$IMR_{it} = \alpha + \beta_1 LnLF_{it} + \beta_2 LnODA_{it} + \beta_3 LnGDP_{it} + \beta_4 LnINV_{it} + \beta_5 LnFER_{it} + e_{1it}$$

$$HDI_{it} = \alpha + \beta_1 LnLF_{it} + \beta_2 LnODA_{it} + \beta_3 LnGDP_{it} + \beta_4 LnINV_{it} + \beta_5 LnFER_{it} + e_{2it}$$

Note:

IMR	: Infant Mortality Rate
HDI	: Human Development Index
LF	: Labor Force
ODA	: Official Development Assistence
GDP	: Gross Domestic Product
INV	: Investment
FER	: Fertility rate
e	: error term
α	: intersep
$\beta_1 ... \beta_5$	: slope
Ln	: Natural Logarithm

Research Methodology

The type of data used in this study is secondary data. This study uses time series data from 2000 - 2017, while cross section data are from the Asian region (Armenia, Azerbaijan, Bangladesh, China, Philippines, Georgia, India, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Laos, Malaysia, Mongolia, Myanmar, Nepal, Tajikistan, Thailand, Turkey, Uzbekistan, Vietnam, Jordan, Yemen).

Data sources in this study are as follows:

1. Data on infant mortality sourced from the World Bank

2. HDI data sourced from UNDP

3. Labor force data sourced from the World Bank

4. ODA sourced from the World Bank

5. GDP at Constant Price 2010 from the World Bank.

6. Investment data from the World Bank.

7. Birth rate data from the World Bank

This study uses panel data regression techniques. Panel data or Pooled Data is a combination of time series and cross sections data. There are several techniques offered, namely Pool Least Square (PLS), Fixed Effect (FE), Random effect (REM).

1. *Pool Least Square* (PLS)

This analysis technique assumes that the intercept and slope coefficients are the same (constant) for each cross section and time series data. In other words, this model does not pay attention to individual dimensions and time.

2. *Fixed Effect*

The Fixed Effect technique is a technique that consider the possibility of researcher facing the problem of omitted variables where these omitted variables might read changes in the intercep time series or cross section. This Fixed Effect technique has included the effects of individual dimensions and time located in the intercept and slope in the model, so that in this model it is assumed that the slope (regression coefficient) and intercept are most influential in the dependent variable. This fixed effect model technique adds dummy variables that are useful for capturing intercept differences between individuals and between times.

3. *Random effect (REM)*

The technique used by adding the error terms that might arise in the relationship between time and regions. This model assumes that the effect of these dimensions lies in the error of the model.

Some tests that can be done are:

1. LM Test

Lagrange Multiplier (LM) is a test to take the Random Effect model or PLS. The following is the research hypothesis:

H_0 : *Partial Least Square*

H_1 : *Random Effect Model*

If the LM statistical value is greater than the critical value of the chi-squares statistic, we reject the null hypothesis, which means that the correct estimate for the panel data regression model is the random effect method rather than the PLS method. Conversely, if the LM statistical value is smaller than the chi-squares statistical value as a critical value, then we accept the null hypothesis, which means the estimation used in panel data regression is the PLS method not the random effect method.

1.   Hausman Test

The hypothesis is as follows:

H_0 = REM

H_1 = FEM

If the probability value is less than α (1%, 5%, or 10%), then H0 is rejected so the model used is FEM and vice versa.

Results

Panel data regression consists of three models, namely PLS, FEM, and REM. The three models will be selected which is the most suitable for analysis. The following are estimated results in this study:

Table 1: Results of Panel Data Regression Estimates with Infant Mortality Rates (IMR) as Dependent Variable

Variable	Model 1 (Dependent IMR)		
	PLS	**FEM**	**REM**
Ln(FDI)	-0,0266*	0,0026	-0,0142*
	(0,0152)	(0,0069)	(0,0078)
Ln(GDP)	-0,4347***	-0,6932***	-0,8018***
	(0,0307)	(0,0324)	(0,0335)
Ln(Fertility)	0,4313***	-0,4296***	-0,0669
	(0,0598)	(0,0747)	(0,0768)
Ln(ODA)	0,0131	-0,0182*	-0,0209*
	(0,0178)	(0,0096)	(0,0111)
Ln(LF)	0,4652***	-0,3104***	0,5891***
	(0,0285)	(0,0979)	(0,0599)
LM test			0,0000***
Hausman test			0,0000***

Note:

IMR   : Infant Mortality Rate

FDI   : Foreign Direct Investment

GDP   : Gross Domestic Product

Fertility   : Birth Rate

ODA   : Official Development Assistance

LF   : Labor Force

Ln   : Natural Logarithm

*,**,***   : Significant at 10%, 5%, dan 1%

Table 1 shows that in model 1 (PLS), variables that have a significant effect on infant mortality rates are FDI, GDP, fertility, and labor force. On FEM, the variables that have a significant effect on infant mortality rates are GDP, fertility, ODA, and the labor force, whereas on REM variable that has a significant effect on infant mortality rates, namely FDI, GDP, ODA, and the labor force. The level of significance of the variable depends on the asterisk, * means significant at 10 percent, ** means significant at 5 percent, while *** means significant at 1 percent.

The LM test and Hausman test results in model 1, namely the infant mortality rate, showed that the model chosen was FEM. This is because the Prob LM test is less than the 1 percent level, so H0 is rejected, and the FEM model chosen, then Prob Hausman is less than 1 percent, so H0 is rejected as well, so the model chosen and appropriately analyzed in model 1 is FEM.

Table 2: Results of Estimation of Panel Data on the Human Development Index as Dependent Variable

Variable	Model 2 (Dependent HDI)		
	PLS	FEM	REM
Ln(FDI)	0,0109***	0,0047***	0,0068***
	(0,0019)	(0,0012)	(0,0012)
Ln(GDP)	0,0677***	0,0930***	0,1040***
	(0,0040)	(0,0057)	(0,0052)
Ln(Fertility)	-0,0436***	0,0309**	-0,0114
	(0,0078)	(0,0131)	(0,0119)
Ln(ODA)	-0,0026	0,0004	0,0011
	(0,0023)	(0,0017)	(0,0018)
Ln(LF)	-0,0840***	0,0009	-0,1031***
	(0,0037)	(0,0173)	(0,0079)
LM test			0,0000***
Hausman test			0,0000***

Information:

HDI   : Human Development Index

FDI   : Foreign Direct Investment

GDP   : Gross Domestic Product

Fertility   : Birth Rate

ODA   : Official Development Assistance

LF   : Labor force

Ln   : Natural Logarithm

*,**,***   : 10%, 5%, and 1% significant level

Table 2 in Model 2 (PLS), shows variables that have a significant effect on HDI, namely FDI, GDP, fertility, and the labor force. On FEM, variables that have a significant effect on HDI, namely FDI, GDP, and fertility, while on REM variables that have a significant effect on HDI namely FDI, GDP and labor force. The level of significance of the variable depends on the asterisk, * means significant at 10 percent, ** means significant at 5 percent, while *** means significant at 1 percent.

The LM test and Hausman test results in model 2 indicate that the model chosen was FEM. This is because the Prob LM test is less than the 1 percent level, so H0 is rejected, and the FEM model chosen. In the other side, Prob Hausman is less than 1 percent, so H0 is rejected as well, so the model chosen and appropriately analyzed in model 2 is FEM.

The next step is testing the classical assumptions. The classic assumptions in question are multicollinearity, heteroscedasticity and autocorrelation. Here are the results of the classic assumptions:

Table 3: FEM Classic Assumption Test

Classic Assumption	Model 1 (IMR as Dependent Var.)	Model 2 (HDI as Dependent Var.)
Multicolinearity	444,10	448,09
Heteroscedasticity	0,0000	0,0000
Autocorrelation	0,0000	0,0000

Table 3 shows that model 1 and model 2 violate classical assumptions. The VIF value of model 1 and 2 are more than 10, so that model 1 and 2 contains a multicollinearity problem, even though both models have been healed with natural logarithmic transformations, but it left unchecked.

Heteroscedasticity and Autocorrelation are present in both models, because the probability of the Wald test and LM test are less than 5 percent. This condition must be cured by Robust test and/or Generalized Least Square (GLS). Robust test is used to cure heteroscedasticity while GLS is to cure autocorrelation. The analysis used for the discussion uses GLS because the cure for GLS gives better results than the Robust test.

Table 4: Robust Test and FEM GLS

Variable	Model 1 (IMR as Dependent)	
	FEM Robust	FEM GLS
Ln(FDI)	0,0026	0,0026
	(0,0073)	(0,0067)
Ln(GDP)	-0,6931***	-0,6932***
	(0,1322)	(0,0313)

	Model 1 (IMR as Dependent)	
Variable	**FEM Robust**	**FEM GLS**
Ln(Fertility)	-0,4296	-0,4296***
	(0,2677)	(0,0722)
Ln(ODA)	-0,0182	-0,0182**
	(0,0271)	(0,0092)
Ln(LF)	-0,3104	-0,3104***
	(0,3788)	(0,0945)

Information:

IMR   : Infant Mortality Rate

FDI   : Foreign Direct Investment

GDP   : Gross Domestic Product

Fertility   : Birth Rate

ODA   : Official Development Assistance

LF   : Labor force

Ln   : Natural Logarithm

*,**,***   : Significant in 10%, 5%, and 1%

Table 4 shows that in Model (FEM Robust), the variables that have a significant effect on infant mortality are GDP. While on FEM GLS, the variables that have a significant effect on infant mortality are GDP, fertility, ODA, and the labor force. Model 1 on FEM GLS, namely GDP, fertility, ODA, and labor force has a significant effect on infant mortality.

Tabel 5: FEM Robust and FEM GLS

	Model 2 (HDI as Dependent)	
Variable	**FEM Robust**	**FEM GLS**
Ln(FDI)	0,0047	0,0047***
	(0,0033)	(0,0012)
Ln(GDP)	0,0930***	0,0930***
	(0,0107)	(0,0055)
Ln(Fertility)	0,0309	0,0309**
	(0,0298)	(0,0127)
Ln(ODA)	0,0004	0,0005
	(0,0019)	(0,0017)
Ln(LF)	0,0009	0,0009
	(0,0379)	(0,0167)

Table 5 shows that in Model 2 (FEM Robust), variables that have a significant effect on HDI is GDP, while on FEM GLS variables that have a significant effect on HDI, namely FDI, GDP, and fertility. The results of this estimation are free from heteroscedasticity and autocorrelation problems, so they do not violate the classical assumptions. As asterisk, * means signifi-

cant at 10 percent, ** means significant at 5 percent, while *** means significant at 1 percent.

Conclusions and Recommendations

Based on the estimation results using panel data regression, the summary of this study are as follows. Estimation results using panel data regression can be concluded as follows. GDP, fertility, ODA, and the labor force have a significant positive effect on IMR in Asia, while FDI has no significant effect on IMR in Asia. FDI, GDP, and fertility have a significant positive effect on HDI in Asia, while ODA and the Labor Force have no significant effect on HDI in countries in Asia.

The governments of Asian countries are expected to make a policy breakthrough to boost GDP, in order to increase HDI even higher. The governments of Asian countries can urge parents to educate their children to develop skills and increase human capacity in order to increase the value of HDI. In order to increase ODA impact on HDI, it is also expected to allocate ODA to the education sector and the like. The governments of Asian countries shall provide programs for newborn children, such as providing free immune and brain vitamins. The government is expected to eliminate various obstacles for forein investors so that incoming FDI can be used to improve HDI in the country.

The study has limitation in the issue and the model. Beside ODA, the independent variables used are FDI, GDP, Fertility and labor force, meanwhile some studies take into account the human capital, trade, infrastructure sector, government spending, health sector, and etc. Method used in this study is static panel, whereas some studies use Panel VECM, dynamic panel, FMOLS, DMOLS, and etc.

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